

# Cogeneration at the RockTenn St. Paul Mill

---

## Minnesota Department of Commerce Technical Work Group Meeting Combined Heat and Power RockTenn St. Paul Mill

October 23, 2013  
Gary Myhrman  
Engineering Manager  
Rocktenn Company  
St. Paul Mill

# St. Paul Mill

---

- Today recycles 390,000 tons per year of waste paper into:
  - 170,000 tons per year of Coated Recycled Board.
  - 200,000 tons per year of recycled Corrugated Medium.

# Recycled Paper Manufacturing Energy Requirements

---

To Produce 370,000 Tons Per Year of Recycled Paperboard The St. Paul Mill Will Annually Consume:

- 2,400,000 MMBtu of Natural Gas.
- 170,000 MWh of Electrical Power of Which 67,000 MWh is Cogenerated.
- Papermaking process thermal and electrical demands are well suited for load following cogeneration.
- The St. Paul Mill has a long history of cogeneration dating back to 1938.

# Steam Generation

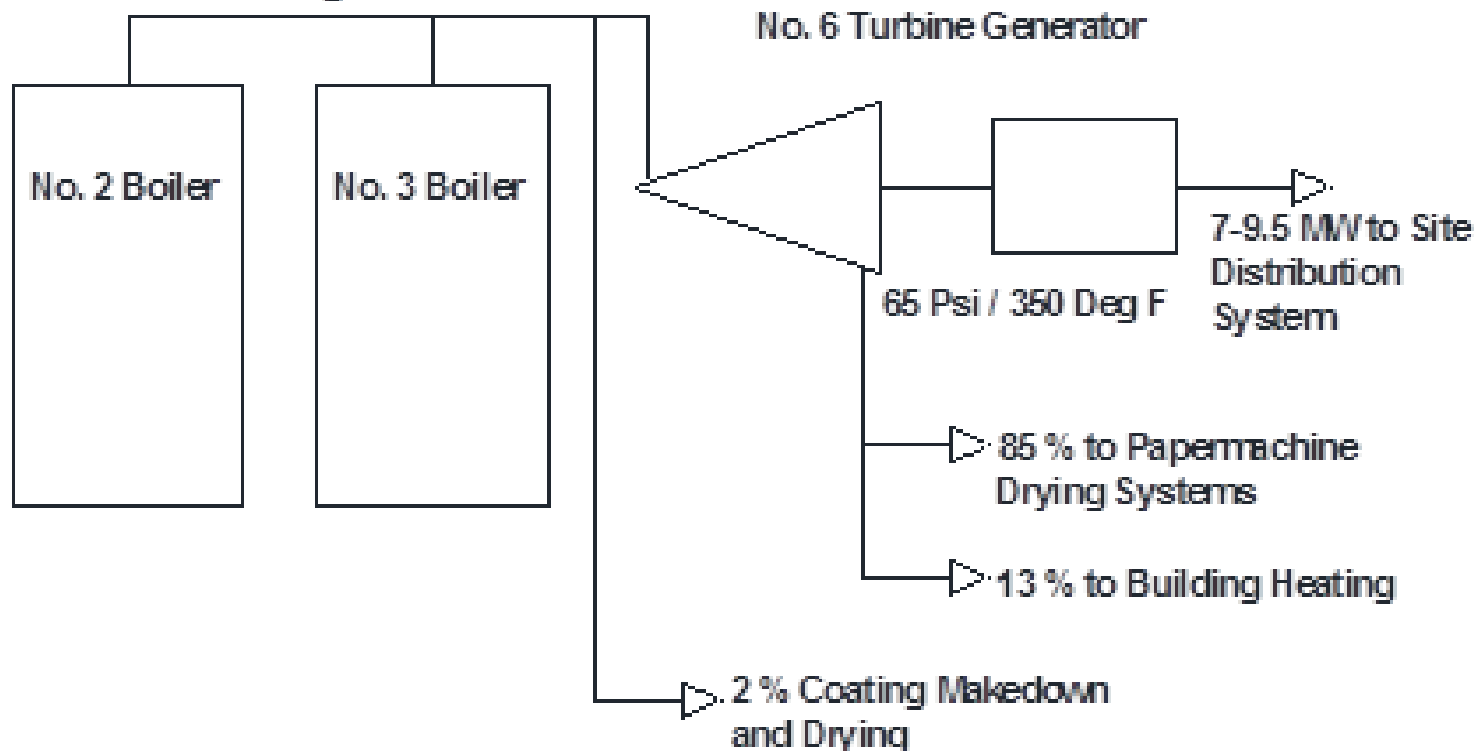
---

- Operate two field erected Riley Stoker boilers.
- Boilers are fueled by natural gas and backed up with fuel oil.
- Generate 190,000 lbs. per hour for process load.
- Increase generation to 200-245,000 lbs. per hour for building heat during heating season.
- Steam is generated at 590 psi / 750 degrees F; approximately 270 degrees of superheat.

# St. Paul Mill Cogeneration

## RockTenn Cogeneration Configuration

190-245,000 Lbs. Per Hour @ 590  
Psi / 750 Deg F



# St. Paul Mill Electrical Demand and Generation Capacity

---

- Mill Process Demand is 21 MW
- Generator Output Range is 7.0-9.5 MW .
- Turbine exhaust steam is used for paper drying, process solution preparation, coating drying and process and building air heating.
- Due to energy conservation initiatives, thermal energy demand is down 30% in the last 5 years, reducing generation capacity.
- Impact to Utility demand levels have been minimal due to electrical conservation initiatives.

# St. Paul Mill Cogeneration Strategy

---

Maximize throughput steam throughput through turbine:

- 97 % of all steam generated flows through one backpressure turbine.
- Power Output is Based on Process and Heating Steam Demand.
  - Turbine is 60-75 % loaded relative to historical loads due to demand reduction initiatives.
  - Turbine Generator output follows process demand.
- Demand and Power Factor Control

# Cogeneration Turbine Generator

---

- Feed 590 psi at 740 degrees F
- Discharges 65 psi steam at 350 degrees F
- Produces power at an average steam rate of 24.4 lbs. per KW
- Runs a leading power factor
  - Targeted to Maintain Utility Power Factor of 90%
- Turbine Efficiency averages 79 %
- System Efficiency averages 64 %



# Cogeneration Benefits and Operating Costs

---

- Cost to Generate- \$ .025/ KWH
- Power Factor Control
- Demand Control
- Peak Control agreement with utility
- Recover Cooling Water for Process Make Up.
- Annual average maintenance costs are \$90,000:
  - \$ 20,000 Routine maintenance
  - 1/5 of 5 year inspection costing \$350,000

# RockTenn St. Paul Mill Cogeneration

---

Questions?